Policies to Support New Nuclear Plants in the United States

Statement of

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Subcommittee on Energy and Resources
of the
House Committee on Government Reform

April 28, 2005

Good morning, Mr. Chairman and members of the Subcommittee on Energy and Resources of the House Committee on Government Reform. I am Donald W. Jones, Vice President of RCF Economic and Financial Consulting, an economic research firm in Chicago which conducts analysis of energy and environmental issues, as well as other economic topics. Together with Dr. George S. Tolley, Professor Emeritus of Economics at The University of Chicago, I co-directed the University of Chicago study of the economic future of nuclear power in the United States. My comments today are based on the findings of that study.

I have been asked to address the issue of policies that would be needed to foster the development of nuclear power and maintain a 20 percent nuclear share of electricity generation by 2020.

Because no construction has begun on a new nuclear plant in the United States since 1973, a number of uncertainties surround the construction of the first few new plants—the success of the new licensing procedure, the construction time, and the delivered cost of the new reactor designs. Uncertainty in an investment raises the cost of capital to a risky project so as to keep the expected rate of return at a level required by the capital market. These uncertainties raise the cost of generating electricity from these plants above levels that would be competitive with electricity generated by coal- and gas-fired plants. Our calculations indicate that the first new nuclear plants could deliver electricity at costs of $53 to $71 per megawatt hour, depending on reactor design and capital cost, while coal- and gas-fired plants would cost from $33 to $45 per megawatt hour. The majority of these uncertainties could be resolved after the construction of the

first several plants, and assuming they are resolved satisfactorily, the nuclear costs would fall to well within the range of fossil-generated costs by the 4th or 5th new plant of a given design. Table 1 shows the progress of nuclear generation costs over the first eight plants of a reactor design with a capital cost of $1,500 per kilowatt of capacity. Learning in construction is assumed to reduce capital costs by 3 percent for each doubling of plants built, which is a conservative estimate of this learning effect according to U.S. and international experience. The generation costs in the right-most column of the table indicate that by the 4^{th} or 5^{th} new plant of this design, generation cost falls to $34 to $36 per MWh, which is competitive with fossil-fired generation costs of $33 to $45 per MWh. The nuclear plant's cost reductions derive from pay-off of first-of-a-kind-engineering (FOAKE) costs borne only on the first plant, shortening of construction time, investors' gaining the confidence needed to eliminate the risk premium and permit higher proportions of debt financing, and learning in manufacturing and construction.

Table 1.

Generation Costs for Successive Nuclear Plants, First to Eighth Plants,
for a $1,500 per kW Plant, with 3% Cost Reduction with Doubling of Plants Built due to Learning in Construction: $ per MWh, 2003 Prices

Plant	***Construction Time***	***Risk Premium on Debt and Equity***	***Debt Share of Financing***	***Generation Cost, $ per MWh***
1	*7 years*	*3%*	*50%*	62
2	*7 years*	*3%*	*50%*	51
3	*5 years*	*3%*	*50%*	45
4	*5 years*	*Gone*	*50%*	36
5	*5 years*	*Gone*	*60%*	34
6	*5 years*	*Gone*	*60%*	34
7	*5 years*	*Gone*	*70%*	32
8	*5 years*	*Gone*	*70%*	32

The first problem to be solved is getting from the first plant to the fourth plant. The Chicago study examined four financial assistance policies applied separately and in various combinations: a production tax credit equivalent to that currently offered to renewable energy development, an investment tax credit, accelerated depreciation, and loan guarantees. Table 2 reports the generation costs on a first plant achieved by each of these policies. An effective combination is a 20-percent investment tax credit and a production tax credit of $18 per megawatt hour for 8 years with a cap of $125 million per plant per year. These would bring the cost of the first plants within the competitive range of coal- and gas-fired plants. Policies such as these should be needed only for the first 4 or 5 plants because of the cost reductions that can be expected after the first plant.

Table 2.

Effectiveness of Financial Support Policies for First New Nuclear Plants

Policy for New Nuclear Plants	Generation Cost, $ per MWh, 2003 Prices		
	Nuclear with Policy	Coal-fired	Gas-fired
Production Tax Credit ($18/MWh for 8 years)	38-56	33-41	35-45
Investment Tax Credit (10 to 20 percent)	44-63		
Accelerated Depreciation (7 years or expensing)	47-67		
Loan Guarantee (25 to 50 percent)	50-67		
Combined Policies: Production Tax Credit Investment Tax Credit	31-46		

An important policy influencing the cost of new nuclear plants is the Nuclear Regulatory Commission's licensing procedure. The new process codified in 10 CFR Part 52 permits resolution of many of the uncertainties surrounding the construction and commissioning of a new nuclear plant prior to the times when major financial commitments must be made. Hopes are high for its successful implementation, but the system remains to be tested. Several comparisons of generation costs illustrate the importance of this new procedure. Licensing that shortens construction time by 2 years and gives investors the confidence to reduce the risk premium on nuclear financing to the level on fossil-fired projects could reduce the generation cost of 8th plants by 25 to 48 percent. Eliminating construction delays also has a significant effect on costs: a 2-year delay in the middle of a construction period would raise generation costs by 11 percent, while a similar delay at the end of construction would raise costs by 23 percent. The methodology of these calculations is reported in detail in the published report of the study, *The Economic Future of Nuclear Power; A Study Conducted at The University of Chicago*, dated August 2004.

Although it was not part of the formal study, our study team reviewed the Subcommittee's question regarding what would be required to maintain the 20 percent contribution nuclear energy makes in meeting overall electricity demand by 2020. According to projections of the growth of electric generation capacity needed to satisfy demand growth, 2 to 4 new nuclear plants could need to come on line each year between 2015 and 2020 if the nuclear share of electricity generation is to remain at 20 percent. This could amount to a total of 15 to 24 new plants, of 1,000 Megawatts each, over a period of 6 years. One important point emerging from these numbers is that the number

and pace of new plants is large enough to permit 5- to 10-percent cost reductions from learning by the 4th and 5th plants of a given type, which would be of considerable value in making those plants competitive.

Thank you very much, Mr. Chairman and Subcommittee members. This concludes my written statement, and I would be happy to answer any questions you might have.